SMA
3568008

SLUDGE MANAGEMENT PLAN

FOR

AGRICULTURAL BENEFICIAL REUSE

OF

MUNICIPAL SLUDGE

FOR

TENKILLER STATE PARK
SEQUOYAH COUNTY, OKLAHOMA

October, 2001

by

Breisch & Associates, Inc.
16 South Main
Sand Springs, Oklahoma 74063-6507
918/245-9533

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Attachments

PART 1. – GENERAL INFORMATION

I. LAND APPLIER NAME

Oklahoma Tourism and Recreation Department

II. OWNER'S AUTHORIZED REPRESENTATIVE

Owner: State of Oklahoma

Kristina S. Marek, Director
Division of Planning & Development
15 N. Robinson, Ste. 100
Oklahoma City, OK 73102
Telephone: 405/521-2974
Fax: 405/522-5356

Engineer of Record for Sludge Management Plan:

Thomas J. Cobb, P.E.
Breisch & Associates, Inc.
16 S. Main
Sand Springs, OK 74063-6507
Telephone: 918/245-9533
Fax: 918/245-9563

III. DESCRIPTION OF SLUDGE, SOURCE & DISPOSAL

A. Description of Sludge

The sludge is generated in total retention lagoons which receive domestic waste from the park facilities.

B. Sources

The lagoons receive domestic sewage from restrooms with showers, RV dump station, boat holding tanks, a restaurant, private residences, and offices. There are no industrial connections.

C. Proposed Use or Disposal

Beneficial use of the sludge through land application is preferred. The sludge must meet regulatory standards and be applied in strict accordance with this plan as approved.

IV. SIGNATURE PAGE

See application form.

V. DESCRIPTION OF SLUDGE USE, DISPOSAL PRACTICES, GENERATOR

A. Source

As described above.

B. Land Application Sites

The Department will contract with a private sludge disposal company to transport and apply the sludge. The contractor will not be identified until the contract for the Tenkiller State Park Sewer Improvements Project is awarded.

The Department proposes to apply sludge to private land located in the vicinity of the Park. The site or sites will not be sites that have previously received sludge or are currently under a separate permit to receive sludge.

VI. PROPOSED APPLIERS

This plan covers a one-time application of sludge. The contractor who will apply the sludge will not be identified until the Sewer Improvements Project is awarded. ODEQ will be notified of the contractor's identity prior to sludge being removed from the lagoons.

PART 2. – SLUDGE SOURCES

I. NAME & ADDRESS OF SOURCE

Tenkiller State Park Wastewater Treatment Lagoons.

Legal Description:

NW/4 of SE/4 of Section 13, T13N, R21E, Sequoyah County, Oklahoma.

II. OWNER/OPERATOR INFORMATION

A. Owner

State of Oklahoma, contact person previously listed.

B. Operator

The person responsible for operation of the lagoons is the Park Manager. The current Park Manager is Steve Williams located at:

Tenkiller State Park
HCR 68, Box 1095
Vian, OK 74962
Telephone: 918/489-5643
Fax: 918/489-2111

III. LEGAL DESCRIPTION

NW/4 of SE/4 of Section 13, T13N, R21E, Sequoyah County, Oklahoma.

Latitude: N 35° 36.07'
Longitude: W 95° 1.70'

A map of the park showing the location of the lagoons is included at Attachment 1.

IV. AREA DIRECTIONS

Enter the Park on Highway 100. Go east on Pine Cone Road about 1,000 feet and take the gravel road to the right. This road leads directly to the lagoons. A highway map is included at Attachment 1.

V. INDIAN LANDS

The lagoons are not located on Indian lands.

VI. MUNICIPAL FACILITY SOURCES

The lagoons only receive domestic sewage generated within the park. This includes sewage from boat holding tanks and one restaurant.

VII. INDUSTRIAL FACILITY SOURCES

There are no industrial sources.

VIII. ENVIRONMENTAL STATE AND FEDERAL PERMITS

The lagoons are classified as "total retention". There are no discharge permits. The ODEQ Facility Number is S-21721.

IX. LOCATIONS AND MONITORING DATA SUMMARIES

To date there has been no monitoring of the sludge. All required monitoring, record keeping, and reporting of sludge use and disposal established in 40-CFR Part 503, will be reported for the Tenkiller State Park Treatment System.

PART 3. – SLUDGE CHARACTERISTICS

I. ANTICIPATED TYPES AND VOLUMES OF SLUDGE

The sludge is generated from the treatment of domestic waste in total retention lagoons. Total lagoon surface area is 2.7 acres. Average annual wastewater production is estimated at 2.3 million gallons. Total sludge accumulation in all cells is approximately 3 feet or 2.5 million gallons at about 3% solids. Estimated weight of the sludge is 258 dry tons.

II. ANNUAL SLUDGE PRODUCTION

This plan is for a one-time application of sludge. When the need arises in the future for additional sludge disposal, these calculations will have to be rerun using updated sludge analysis results.

III. LABORATORY ANALYSIS

A laboratory analysis of the sludge is included as Attachment 2.

IV. SLUDGE EXPECTED DURING EACH YEAR

This plan is for a one-time application. The proposed lagoon system will store sludge on site in the lagoons for a minimum of twenty years.

V. CHEMICAL AND PHYSICAL SLUDGE PROPERTIES

A laboratory analysis of the sludge is included as Attachment 2.

PART 4. – SLUDGE TREATMENT

I. TREATMENT METHODS

All domestic waste from the park is sent to the total retention lagoons. The lagoon cells are four to six feet deep. The sludge accumulates in the bottom of the cells where it is digested. There are four cells in the south system and two cells in the north system.

II. PLANT OPERATIONAL CONTROLS

Wastewater is pumped to the south lagoons. The north lagoons receive wastewater by gravity and by pumping. The waste flows through primary cells and then to storage ponds for evaporation.

III. PATHOGENS AND VECTORS

A. Pathogen Treatment

Pathogens are treated by the sludge digestion process which takes place at the bottom of the lagoon cells.

Beneficial use of the sludge through land application is the preferred method for ultimate disposal.

Operational techniques to control residence time and pH levels ensure stabilization and pathogen reduction of the produced sludge.

B. Vector Attraction Reduction Measures

One of the following three vector attraction reduction methods shall be employed when land applying the sludge:

1. The mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38 percent [40 CFR 503.33 (b)(1)].

2. Sewage sludge shall be injected below the surface of the land [40 CFR 503.33 (b)(9)(i)].

3. Sewage sludge applied to the land surface or placed on a surface disposal site shall be incorporated into the soil within six hours after application to or placement on the land [40 CFR 503.33 (b)(10)(i)].

VI. RECORDKEEPING

There are no recordkeeping forms proposed for treatment of the sludge in the lagoons. Forms for use during land application are described below.

PART 5. – LAND APPLICATION SITE

The Owner proposes to use land application sites within easy haul distance from the Park. One potential site has been identified as discussed in Part 6. The contractor has the option to find other approvable sites as long as the requirements of this plan are met.

All landowners/operators desiring to receive sludge must sign a Sludge Receiver's Agreement included as Attachment 3.

The contractor applying the sludge shall take soil samples from all fields for laboratory analysis prior to sludge application.

Each field will be sampled by taking a number of cores and mixing them to form a composite sample. The cores will be obtained with a tube-type soil sampler (1-inch diameter) by first scraping away surface litter and then inserting the sampler to the depth of sludge placement. The cores will be taken while traversing a "zigzag" pattern across the field so as to obtain a representative sample of the particular field. Care will be taken to avoid areas with soil conditions that are atypical, such as fertilizer or lime spills, poorly drained areas, dead furrows, fertilizer bands, or any other unusual area. After mixing, the composite sample will be packaged and sent to a laboratory for analysis.

Results of soil analysis will be included within each site package. In the event that a site is used for additional sludge application in the future, the field shall be re-sampled and re-tested prior to any succeeding sludge application.

A location map will be provided in each Site-Specific Plan indicating the site location and showing the general vicinity. A site plan will be prepared directly on a U.S.G.S. 7.5 minute quadrangle base map. Pertinent physical features will be shown. Existing features not on the published map will be detected during the course of field surveys and noted.

Each Site-Specific Plan shall contain all information required by OAC 252:647-3-37.

PART 6. – SPECIFIC SITES

At the time of this publication, one specific site had been identified. Site-Specific information is included at Attachment 4.

The Contractor may select other sites contingent upon submittal and approval of a Specific-Site plan as described in Part 5 of this Plan.

PART 7. – TRANSPORTATION, TRANSFER, STORAGE AND CONTAINMENT OF SLUDGE

Sludge shall be removed from the cells by floating dredge which pumps directly to enclosed tank trucks. As an alternate method, the water from the cells will be pumped to other cells which are to remain in operation. The sludge will be left to thicken to about 20% solids and then removed by front end loader.

The transport trucks will employ the most direct routes to the various land application sites as influenced by traffic and road conditions. All applicable road and bridge restrictions will be observed.

Refer to the Emergency Response Plan below for procedure to follow in the event of a spill.

PART 8. – OPERATIONS

I. EQUIPMENT

Both direct injection type and liquid surface type spreaders will be allowed. If surface spreaders are used, the sludge will be thoroughly disked into the top 6 inches of the soil.

The following items of equipment may be used by the land application contractor:

A. Tractors of various sizes and styles.

B. Liquid sludge applicator with spray or sub-surface injectors.

C. Various discs and/or other cultivators, for incorporation of sludge.

D. Tanker trucks, approximately 6000-gallon capacity.

E. Flexible wire harrow, for incorporation of sludge.

F. Front-end loaders.

II. LAND APPLICATION METHODS

Sludge material must be evenly applied at the rate described below in this plan. Application equipment shall be calibrated periodically to insure that the sludge is being applied at the proper rate and in a uniform manner. Direct injection type equipment and liquid surface type spreaders require different calibration methods. Calibration of these types of equipment shall be accomplished by measuring a specific volume of fluid (V) into the tank and applying it to a measured area of land (A). The application rate could then be calculated as long as the solids concentration (C) of the sludge is known. The formula is as follows:

$$\text{App. Rate} = \frac{V \times S \times C}{2000 \times A \times 100}$$

Application Rate in Dry Tons per Acre

V – Volume of Sludge Applied in Cubic Feet
(Gallons / 7.48)

S – Unit Weight of Sludge in Pounds per Cubic Foot
(62.4 x Specific Gravity of Sludge – approximately 64 pounds per cubic foot)

C – Solids Concentration in Percent

A – Area of Application in Acres (Square Feet / 43560)

All application equipment shall be calibrated at least two times per day during application operations and all calibration procedures shall be recorded for the file. In addition, all calibrations and applications shall be performed with the operator maintaining a constant speed with the equipment. Since the application will be done at low speed, the operator shall maintain a constant speed by using one selected gear and maintaining a selected rpm.

Other application restrictions are as follows:

Sludge shall not be applied when the soil is saturated, frozen, or snow-covered.

Sludge shall not be applied when rainfall is imminent.

Sludge shall not be applied to land within the 100-year floodplain.

A minimum of 2.0 feet shall be maintained between the deepest point of sludge placement and the highest elevation of the seasonal high wastewater table.

Sludge shall not be applied within 10,000 feet of an airport utilized by turbojet aircraft nor within 5,000 feet of a public use airport utilized by piston engine aircraft unless prior approval has been received by the Federal Aviation Administration.

Sludge shall not be applied to land with slopes exceeding 5%.

All surface applied sludge will be soil incorporated within six hours of sludge application with conventional tillage equipment. Usually incorporated with a flexible wire harrow. In areas where odor is a particular concern, disking operations will take place as soon after application as practicable to minimize potential complaints from neighbors.

III. FREQUENCIES AND RATES OF APPLICATION

This plan is for a one-time application of sludge.

The application rate shall be determined for each specific site based on a metals/nutrient assessment as described below. In no case shall be application rate exceed 25 dry tons per acre.

IV. FIELD TYPE/CROPPING PATTERNS

Sites are limited to those with slopes of 5% or less. No special erosion control provisions are necessary.

The principal grain crops grown in the area consist of wheat, soybeans, oats, and milo. Large areas are devoted to the production of Bermuda sod, native and introduced hay crops and the grazing of cattle and horses.

V. METALS/NUTRIENT ASSESSMENT

A. Regulatory Limitations. Allowable application rates are determined according to prescribed limitations of each critical constituent of the sludge. Constituents which warrant further investigation and their application limit are described below. In addition, the OSDH has prescribed maximum application rates regardless of the calculated rate. These guidelines are also summarized below.

NITROGEN: The allowable pounds of nitrogen applied depends on the crop which is to be planted. Different crops have different nitrogen uptake rates. Since many possible crops could be utilized, several crops were investigated. Their average nitrogen uptake rates are listed below.

Crop	Uptake Rate* (lb/AC)	
	Range	Use
Bermuda Grass	100-350	200
Native Grass	50-100	75
Other Forages	100-350	200
Corn	120-230	150
Rye	50-100	75
Oats/Barley	50-100	75
Soybeans	150-300	200

*From EPA Process Design Manual, "Land Application of Municipal Sludge".

It should be noted that the calculations of the nitrogen application will include only the nitrogen that is available to the plants called Plant Available Nitrogen (PA-N). Also, the nitrogen limits are on a per growing season or annual basis. Nitrogen utilization would continue as long as the crop is raised and harvested.

HEAVY METALS: The allowable cumulative (lifetime) limits of various heavy metal is dependent on the Cation Exchange Capacity (CEC) of the soil. Limitations are summarized below for critical metals:

Metal	CEC meg/100g ≤ 5	5-15	≥15
	Limitations in lb/AC*		
Lead (Pb)	500	1000	2000
Zinc (Zn)	250	500	1000
Copper (Cn)	125	250	500
Nickel (Ni)	125	250	500
Cadmium (Cd)	4.46	8.92	17.84
Selenium (Se)	7.1	7.1	7.1

*Table from EPA Process Design Manual – "Land Application of Municipal Sludge".

Oklahoma: In addition to the limits described above, the ODEQ has limited the agronomic beneficial use application rate for sludge to 8 dry tons per acre on an annual basis. This limitation precludes any calculated rate.

B. Annual Application Rates. Using the regulatory limits defined above annual and lifetime allowable application rates can be determined. The principal constituent which affects the annual allowable application rates is nitrogen.

NITROGEN: As described earlier in this report, the allowable nitrogen application rate depends on the amount of nitrogen which can be utilized by the crops. Calculation forms which summarize the determination of allowable application rates for various crops are shown in Attachment 5. A summary of the results is shown below:

Crop	Annual Application Rate – CT/AC Calculated Max.	ODEQ Max.
Bermuda Grass	607	8
Native Grass	228	8
Other Forage	607	8
Corn	455	8
Rye	228	8

Oats/Barley	228	25
Soybeans	607	25

As can be seen above, the practical limit of 25 dry tons per acre per year for agronomic beneficial use controls for every crop listed.

C. Lifetime Application

At a maximum application rate of 25 dry tons, lifetime limits will not be met with one application. If additional applications are made in the future, the lifetime limits should be recalculated based on the sludge characteristics at that time.

VI. ON-SITE SLUDGE STORAGE

Sludge will be transported to the site and applied the same day it is removed from the lagoon. Therefore, no storage will be required at the lagoon site or the land application site.

VII. SOIL pH ADJUSTMENT

A site with soil having a pH of less than 6.5 must be lime treated to a pH of 6.5 or greater prior to sludge application. Lime requirements will be established in the laboratory. Different soil types found at each site should be sample tested separately and the highest recommended application rate used in the treatment unless the interface between the soil types can be easily located and defined.

Lime shall be spread in a slurry form at 1.1 times the laboratory recommended rate. Tank trucks with spreader bars are suitable for this procedure. Dry lime can be used if winds do not create problems such as excessive loss of lime (before it's incorporated into the soil), lime blowing on adjacent property, etc. The application rate shall be checked intermittently to insure consistent coverage. The rate can be checked by the use of a tarp and a set of scales. The procedure is as follows:

A. Obtain a square tarp with its dimension no greater than the width of the application. Determine its dimensions and compute its area in square feet (A).

B. Weight the tarp and record its initial weight in pounds (W_1).

C. Spread the tarp on the ground in the path of the spreader and allow the spreader to run over the tarp. Insure that the entire tarp is within the width of the application.

D. Carefully lift the tarp without loss of any of the lime slurry which was caught. Weigh the tarp and lime (W_2).

E. The application rate in tons per acre can be computed as follows:

$$\text{App. Rate} = \frac{(W_2 - W_1) \times 43560}{A \times 2000}$$

After application of the lime slurry, the soil shall be disked. Disking shall include two passes, the direction of the second being roughly perpendicular to the first.

Once the lime treatment process described above is complete, the soil shall be retested in order to establish the modified pH. If all tests do not indicate pH values of 6.5 or greater, the operation shall be repeated (at least for the field portion with low pH reading).

All test results, operations, etc., performed shall be summarized in report form and made a part of the permanent file of the specific site. Such information shall also be included as an attachment to the Field Report which will be part of the Monthly Activity Report (see Attachment 6).

VIII. ESTIMATED APPLICATION RATE OF SLUDGE AND LIFE OF SITE

Application rates shall be as described above. As discussed above, the estimated life of each specific site will depend on the characteristics of sludge applied in the future, if any.

IX. EMERGENCY RESPONSE PLAN

The following procedures and practices will be adhered to in order to minimize the possibility of a spill and to establish an effective response in the unlikely event of a spill:

A. Spill Prevention

1. Ensure truck drivers watch trailer while loading.
2. Ensure tank hatches are closed and latched while transporting.
3. Inspect tank hatches daily and replace or repair as necessary.
4. Ensure dust caps are in place while transporting.
5. Ensure uploading operations in the field are conducted so as to minimize stockpile area.
6. Establish and maintain good sanitation practices at loading and offloading zones so as to avoid tracking of sludge material onto roadways.
7. Ensure dust covers (tarps) are in place when hauling material in open dump trucks.

B. Spill Control

In the unlikely event of a spill, the following actions will be taken immediately:

1. HALT SOURCE OF SPILL
   i.e., ruptured line or valve or damaged truck unit.

2. CONTAIN SPILL
Use straw bales or similar containment material to form a barrier. Containment material shall be kept at the project site for such purposes.

3. CLEAN UP
Employ loader equipment to remove as much spilled material as possible. Complete clean up with hand tools if necessary and dispose of in an approved manner.

4. FINAL CLEAN UP
Flush roadways contaminated with wastewater as necessary to clean. Allow to dry and incorporate into soil if spill occurs on a non-paved and tillable area. In the event a spill occurs on private property, final clean up should be completed immediately to the satisfaction of the owner.

5. REPORTING
As soon as possible after the spill, notify the Oklahoma Tourism & Recreation Department (OTRD) at 405/521-2974 and the Sequoyah County Health Department. Within twenty-four (24) hours of the spill, a written report detailing how the spill occurred and all actions taken shall be sent to OTRD and the County Health Department offices.
If the spill occurs on a state or federal highway the Highway Patrol should be notified for traffic control. The County Health Department shall be notified of all spills except those that occur at the wastewater treatment plant.
All spills shall be recorded in the operational records. Information shall include location of spill, type and volume of sludge spilled, cause of spill, date and time of spill, personnel involved, clean up measures taken, officials notified, and other comments and information that might be important for record purposes. A report form is included as Attachment 7.

6. MANAGEMENT OF CLEAN UP
The project manager shall take immediate charge and initiate clean up activities. Contractor's labor and/or park forces shall be used as needed. The project manager shall also communicate with the public on the scene answering questions and advising of clean up activities.

PART 9. – RECORDKEEPING AND REPORTING

During the land application of biosolids, one random grab sample of sludge will be taken from the system on a daily basis. The sample will be split and a portion retained to create a weekly composite sample. A portion of the weekly composite sample will be retained to create a monthly composite sample. Daily samples will be tested for total solids. Weekly samples will be tested for total solids, density, and pH. The monthly composite will be tested for the parameters listed in Attachment 2.

A Daily Operations Report (Attachment 8) will be filled out and retained on record for each day of land application of sludge. At the completion of the monthly composite analyses, a Monthly Sludge Application Report will be compiled (Attachment 9). In addition, the Sludge Project Coordinator or designee will fill out a Daily Inspection Report (Attachment 10).

The test parameters from the monthly composite, and the monthly sludge application report, are filed with the Oklahoma Department of Environmental Quality, and landowner.

As required, the Oklahoma Department of Environmental Quality will be notified of operational schedules and locations of sites to receive sludge. Currently, a minimum of 24 hours advance notice is required.

In order to ensure that sludge are continuously applied at the correct rate and in a manner consistent with the project design, the Sludge Project Coordinator or designee will be in direct charge of field operations.

Duties shall include:

1. Flagging of buffer zones prior to application.
2. Formal field inspection each operating day.
3. Sample collection.
4. Inspection reports.
5. Haul route inspection.
6. Equipment inspection.

PART 10. – MAPS, DRAWINGS, SPECIFICATIONS

I. TOPOGRAPHIC MAPS OF SITE

Attachment 4 contains USGS maps of the specific site which has been identified in this plan. Similar maps shall be submitted by the contractor for other sites proposed for application of the sludge.

II. OTHER MAPS

A. SCS Soils Map – See Attachment 4 for the map covering the proposed site. The contractor shall provide similar maps for other sites he proposes.

B. Highway Map – See Attachment 1 for a highway map of the project area.

C. Map Showing Source Location – Location of source and transportation routes is shown on the map at Attachment 1.

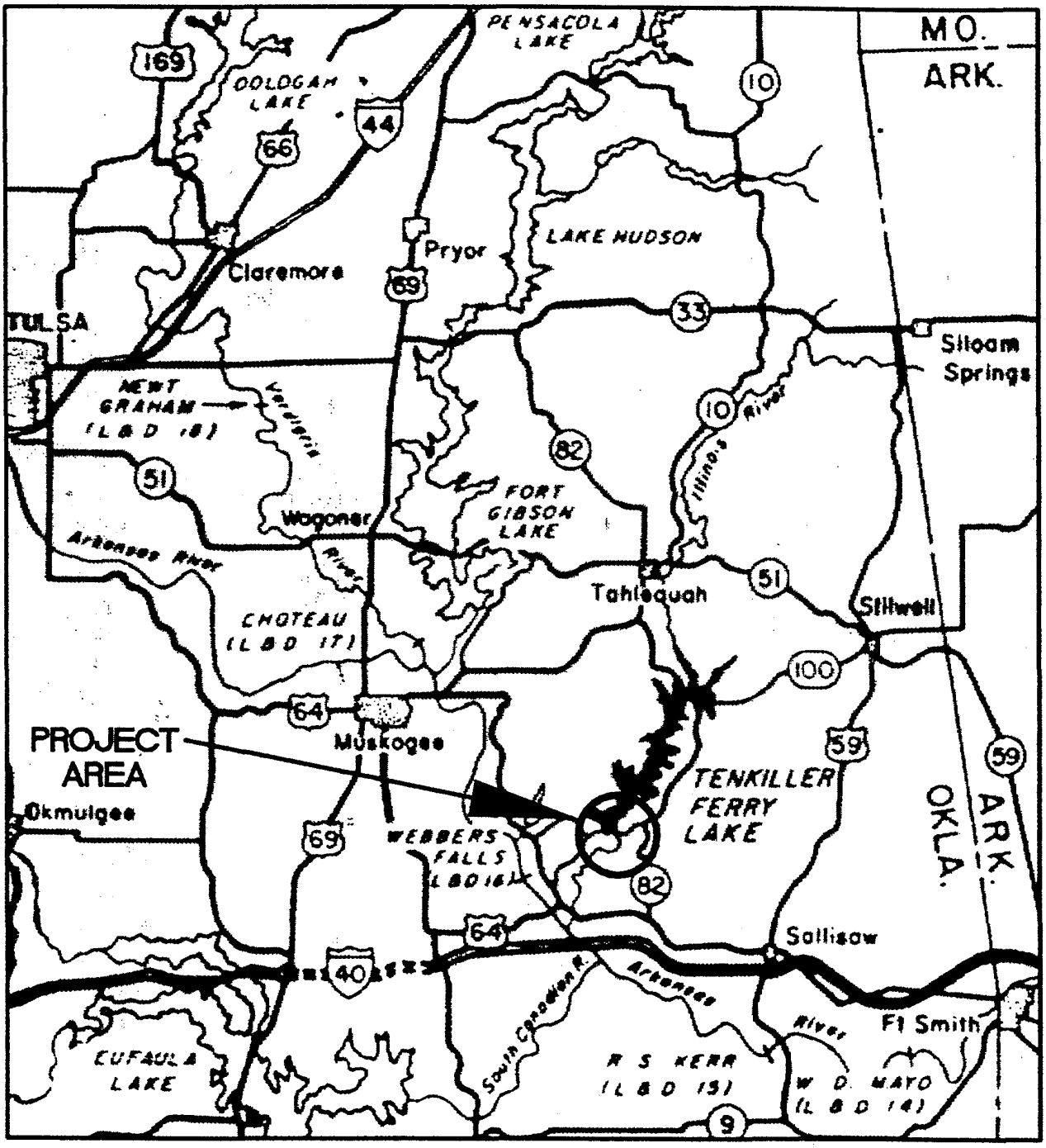
PART 11. – ADDITIONAL REQUIREMENTS

I. NOTICE REQUIREMENTS

If the contractor proposes the addition of new disposal sites not described in this plan, a site specific plan shall be submitted to the OTRD which meets the requirements of OAC 252:647.

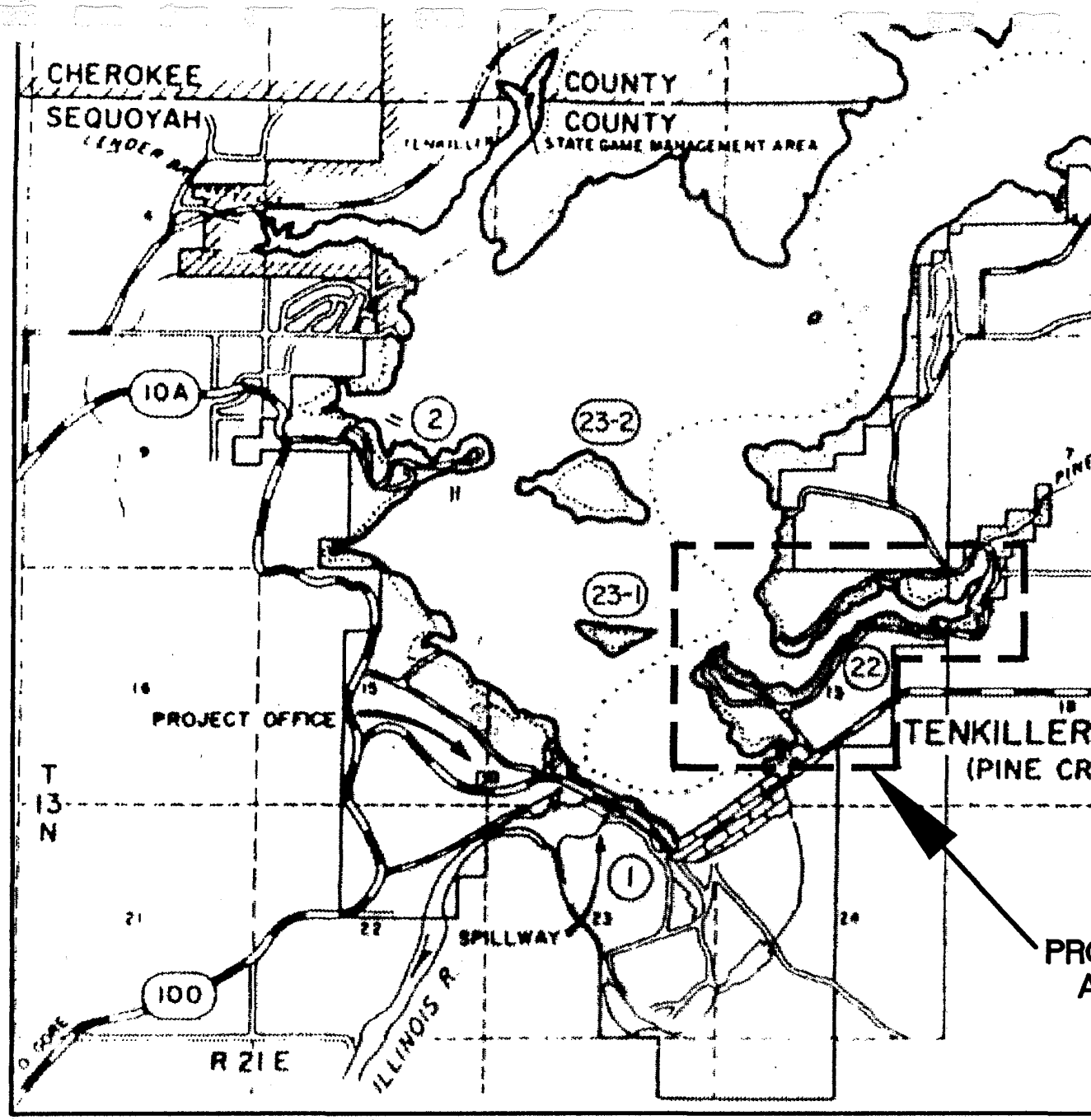
ATTACHMENT 1

MAPS

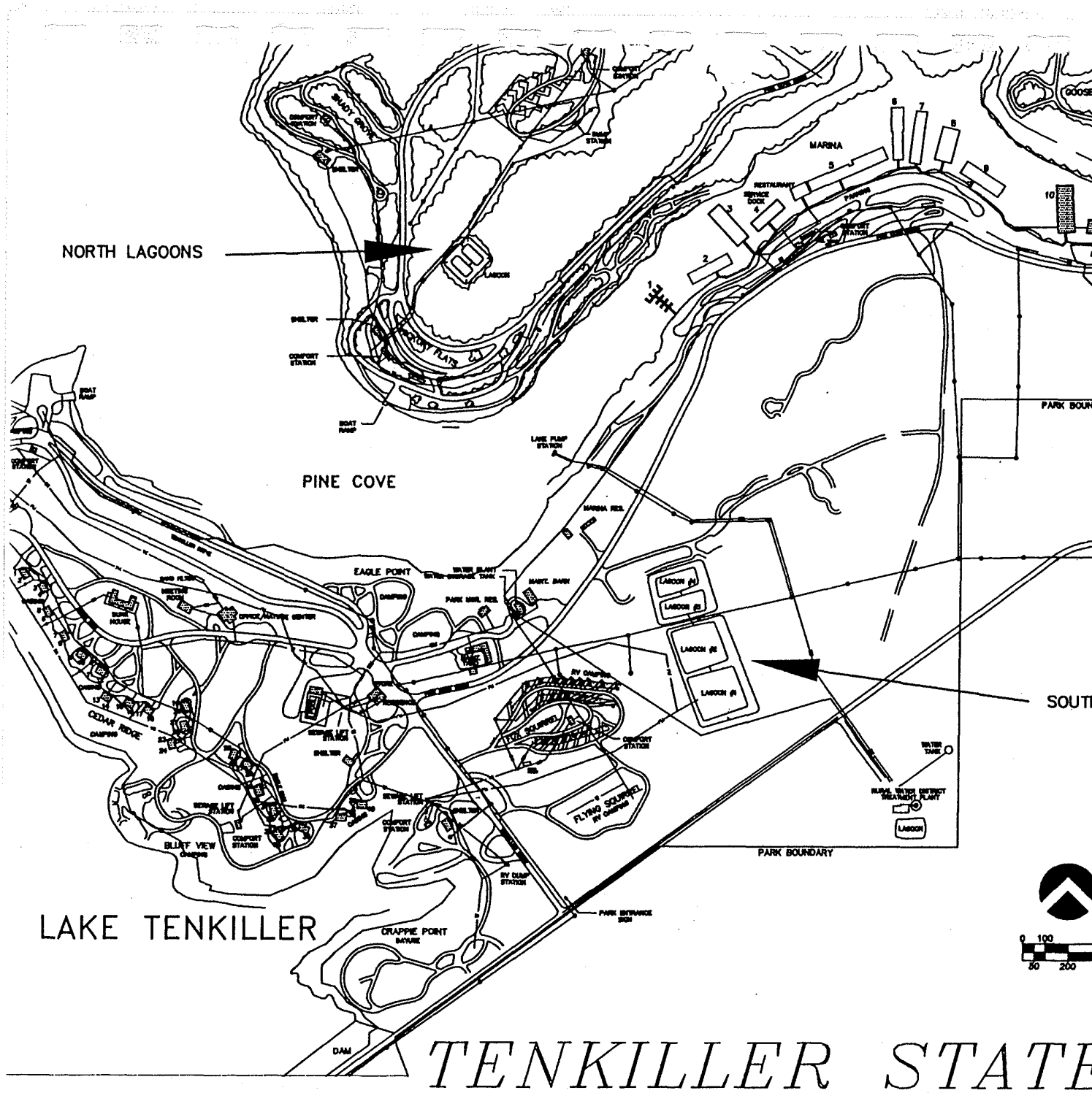


VICINITY MAP

N.T.S.



LOCATION MAP
N.T.S.



ODEQ-115-0002029

ATTACHMENT 2

LABORATORY ANALYSIS OF SLUDGE

Environmental Support Services

207 Lakeside Drive South • P.O. Box 876
Sand Springs, Oklahoma 74063
(918) 245-0281

Client: Tenkiller State Park
Sample I.D.: Sludge
ESS Lab I.D.: 01-0413
Date Sampled: 06/01/01
Date Reported: 07/03/01

Parameter	Result	Units	Detection Limit	Date and Time	Analyst
% Solids	45.0%			06/12/01 1100	JJ
Nitrate/Nitrite	<0.05	mg/kg	0.05	06/18/01 1400	JJ
Phosphorous	2.0	mg/kg	0.01	06/22/01 1100	JJ
Potassium	376.0	mg/kg	0.1	07/03/01 1230	JJ
Total Volatile Solids	6.4%			06/13/01 1300	JJ
Ammonia	4.04	mg/kg	0.01	06/21/01 1200	JJ
Total Organic Nitrogen	4.89	mg/kg	0.01	06/21/01 1200	JJ
As	<0.05	mg/kg	0.05	06/24/01 0930	LJ
Cd	<0.01	mg/kg	0.01	06/23/01 1110	LJ
Cr	<0.5	mg/kg	0.5	06/23/01 1100	LJ
Cu	9.1	mg/kg	0.01	06/23/01 1045	LJ
Pb	9.7	mg/kg	0.05	06/23/01 1315	LJ
Hg	<0.01	mg/kg	0.01	06/23/01 1000	LJ
Mo	<0.6	mg/kg	0.6	07/03/01 1120	LJ
Ni	8.1	mg/kg	0.05	07/03/01 1030	LJ
Se	<0.5	mg/kg	0.5	06/24/01 1120	LJ
Zn	65.5	mg/kg	0.05	07/03/01 1100	LJ
Coliforms	*See Attached*				

Methods are in compliance with 40 CFR, Part 136 or SW 846

Parameter	Method Number
Nitrate/Nitrite	354.1
Phosphorous	365.2
Potassium	258.1
Total Volatile Solids	160.4
Ammonia	350.2
Total Organic Nitrogen	351.4

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Environmental Support Services

207 Lakeside Drive South • P.O. Box 876
Sand Springs, Oklahoma 74063
(918) 245-0281

#01-413 Continued

As	206.2
Cd	213.1
Cr	218.1
Cu	220.1
Pb	239.1
Hg	245.1
Mo	246.1
Ni	249.1
Se	270.2
Zn	289.1

Quality Control/Quality Assurance

Parameter	Result	Dupl	%Diff.	%Rec. Spike 1	%Rec. Spike 2	Spike % Diff
Nitrate/Nitrite				104		
Phosphorous				89.5		
Potassium				88.8		
Ammonia				90		
Total Organic Nitrogen				112		
As				105		
Cd				107		
Cr				99.8		
Cu				100.2		
Pb				108		
Hg				105		
Mo				93.4		
Ni				93.9		
Se				92.7		
Zn				106		

Jeffrey Jenkins, CIH

TULSA CITY-COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH SERVICES LABORATORY
4616 E 15th TULSA, OK 74112-6199
918-595-4200

ENVIRONMENTAL SUPPORT SERVICES
PO BOX 876
SAND SPRINGS OK 74063

LOCAL DEQ (TULSA)
5051 SO 129TH E AVE
TULSA OK 74134-7004

COLLECTED	05/31/2001	14:00
RECEIVED	06/01/2001	10:30
ANALYZED	06/01/2001	14:00

MSIS #:
LAB ID - SAMPLE ID 30007 - 275075

FACILITY ENVIRONMENTAL SUPPORT SERVI
OWNER
OPERATOR
COUNTY TULSA

COLLECTOR
COLLECTED AT SLUDGE/01-0413
LOCATION CODE 01-0413
CHLORINE 0

TEST	RESULT
PA/MPN	>2419 *
EC/MPN	>2419 *

ANALYST REMARKS
** Upon filtration with m-endo medium non-coliform organisms were so overwhelming that counts were impossible to ascertain. A MPN method using quantitry and colisure produced the counts represented. PA represents total coliform coun of >2419 colonies per gram in 100 mls of DI water and EC represents E coi counts >2419 colonies per gram in 100 mls of DI water.

Monday, June 04, 2001

Enviromental Support Services

207 South Lake Drive - P. O. Box 876
Sand Springs, Oklahoma 74063
(918) 245-0281

CHAIN OF CUSTODY

REPORT RESULTS TO:		SEND INVOICE TO:	
NAME Tom Cobb	TITLE	PURCHASE ORDER NO.	
COMPANY Breisch + Assoc.		NAME SAME	
MAILING ADDRESS 16 South Main		COMPANY	
CITY, STATE, ZIP Sand Springs, OK		ADDRESS	
TELEPHONE NO.		CITY, STATE, ZIP	

Your Project Number:

Project Name: Tenneco

TURN AROUND TIME REQUESTED (Additional Charges May Apply.)

☐ 5 Day ☐ 72 Hours ☐ 48 Hours ☐ 24 Hours ☐ Same Day

Results: ☐ Mailed ☐ Faxed Fax # _____

ANALYSIS REQU

SAMPLE IDENTIFICATION/DESCRIPTION	MATRIX TYPE	DATE SAMPLED	TIME SAMPLED	PRES.	NO. CONT.	Sludge Analy
LAGOON #1		5/31/01	13:00		1	
#2			13:10		1	
#3			13:20		1	
#4			13:30		1	
5			13:50			
6			14:00			

SAMPLER (SIGNATURE):	RELINQUISHED BY:			DATE 6/1/01	TIME 9:30
RELINQUISHED BY:	DATE	TIME	RECEIVED BY:		RELINQUISHED BY:
SHIPPED BY:	RECEIVED FOR LABORATORY BY: Karen Hucks		DATE 6/1/01	TIME 9:30	CONDITION OF SAMPLE

COMMENTS:

ATTACHMENT 3

LANDOWNER'S AGREEMENT

LANDOWNERS AGREEMENT
AGRICULTURE BENEFICIAL REUSE
PLOT PLAN

Land Owners Name: _____

Address: _____

Phone Number: _____

This letter is for the purpose of authorizing the application of sludge to my farm located: (Include County) _____

_____

_____

Below is a list of conditions I have agreed to follow and will report any of these conditions which are violated.

1. Dairy animals shall be excluded for thirty (30) days from the area where sludge is applied.

2. Direct human consumption food chain crops shall not be grown for eighteen (18) months.

3. The access to the general public shall be controlled for twelve (12) months.

4. Sludge shall be incorporated into the soil at the time of application.

5. Sludge applied to land within the 100 year flood plain shall be applied prior to the rainy season and a vegetative cover established.

6. Sludge shall not be applied to land having a slope exceeding 5 percent.

7. Sludge shall not be applied within two (2) feet of the highest seasonal water table.

8. Sludge shall not be applied to land within 100 feet from a stream or body of water.

9. Sludge shall not be applied within 250 feet of a private water supply or 600 feet of a public water supply.

10. No off site storage of sludge. No stockpiling of sludge.

11. Sludge should be applied only to soil having a pH of 6.5 or greater. The soil may be treated with lime to raise the pH before sludge application.

12. Each annual application must be followed by a crop.

Landowner's signature _____ Date _____

ATTACHMENT 4

SPECIFIC SITE – NEAL PACK PROPERTY

SPECIFIC SITE PLAN
NEAL PACK PROPERTY

A. NEAL PACK PROPERTY

B. SITE OWNER:
Neal A. Pack
HCR 68, Box 56S
Vian, OK
Phone (918) 773-5794

C RIGHT TO USE/TIME RESTRICTIONS
The Owner has signed a Land Owners Agreement which is included herein. Time of application shall be coordinated between the Owner and the Contractor.

D. LAND USE WITHIN TWO MILES: Primarily agricultural.

E. LAND USE PLANNING
1. Zoning: The site is outside any City limits and is used for agricultural purposes only.
2. Adjacent Property: The property adjacent to the application site is agricultural. This use is not anticipated to change.

F. LOCATION
1. Address: Same as site Owner.
2. Legal Description: NE SW & E2 NW SW & S2 SW & NW NW SE & SW SW NE & E2 SW NE & E2 NE & S2 S2 SE NE & NE SE NE Section 17, T13N, R22E, Sequoyah County, OK
3. Latitude: N 35° 36.2'
Longitude: W 94° 59.75'

G. DISTANCE TO NEAREST RESIDENCE: 100'

H. NEAREST INDUSTRIAL FACILITY: N/A

I. ACCESS ROADS: Sequoyah County roads – asphalt with bar ditches, no bridges.

J. SITE TOPOGRAPHY: Site is open pasture or hay meadow with slopes less than 5%. A USGS topography map is included in this section.

K. SOILS
1. Types: Predominantly loam and silty loam. Refer to Soils Map included in this Attachment.
2. Permeability: Permeability in most areas ranges from 0.8 to 10 inches per hour.
3. Infiltration: Infiltration to ground water should not be a problem. Plant uptake of available moisture is high.
4. Drainage Patterns: Slopes range from 1 to 5% in the areas being considered. Drainage is generally to the south to Red Bird Smith Creek.

L. CROPPING
1. Soil Tillage: None.
2. Cropping Utilization: Hay or pasture grass.
3. Expected Yield: 200 large bales/cutting/40 acres.
4. Final Use: Animal feed.

M. IRRIGATION: None

N. DEPTH TO GROUNDWATER: The Water Resources Board has no record of any water wells in this section. Wells in adjacent sections show water levels ranging from six inches to seventy feet below the surface.

Interviews with Mr. Pack reveal no actual data, but Mr. Pack has seen no indication of shallow groundwater.

The preferred area for sludge application is on high ground which is less likely to have a shallow water table. In any event, the contractor shall excavate a test pit at least three feet deep to verify depth to groundwater exceeds two feet.

O. WATER FEATURES: See map included herein.

P. WATER AND WASTEWATER FACILITIES: Sequoyah County Water Association water treatment plant is located near the entrance to Tenkiller State Park, about two miles from the site. Raw water supply is Tenkiller Lake.

Q. WATER WELLS WITHIN ¼ MILE: None.

R. PUBLIC WATER SUPPLY SOURCE WITHIN ½ MILE: None.

S. ON-SITE PIPELINE/UTILITY EASEMENTS: None.

T. ON-SITE PRODUCING OIL/GAS WELLS OR DRILLING SITES: None.

U. 100-YEAR FLOOD PLAINS OR FLOODWAY WITHIN ¼ MILE: None.

V. PREVIOUS LAND APPLICATION OF SLUDGE: None.

W. PREVIOUS MONITORING: None.

X. ENDANGERED OR THREATENED SPECIES: None identified.

Y. ACCESS CONTROLS: Site is privately owned and fenced. Area not open to public.

Z. SURFACE WATER CONTROL:
Sludge shall not be applied to surfaces with slopes exceeding 5%, Sludge shall be injected 6 inches deep or tilled into the top 6 inches of soil immediately after application. Sludge shall not be applied if rain is imminent or immediately after a rain.

AA. BUFFER ZONE: Application site is located greater than 100 feet from any residence or structure.

LANDOWNERS AGREEMENT
AGRICULTURE BENEFICIAL REUSE
PLOT PLAN

Land Owners Name: NEAL A. PACK
Address: HCR 68, Box 565, VIAN, OK
Phone Number: 918-773-5794

This letter is for the purpose of authorizing the application of sludge to my farm located: (Include County) NE SW & E2 NW SW & S2 SW & NW NW SE & SW SW NE & E2

SW NE & E2 NE & S2 S2 SE NE & NE SE NE Sequoyah County, OK

Below is a list of conditions I have agreed to follow and will report any of these conditions which are violated.

1. Dairy animals shall be excluded for thirty (30) days from the area where sludge is applied.
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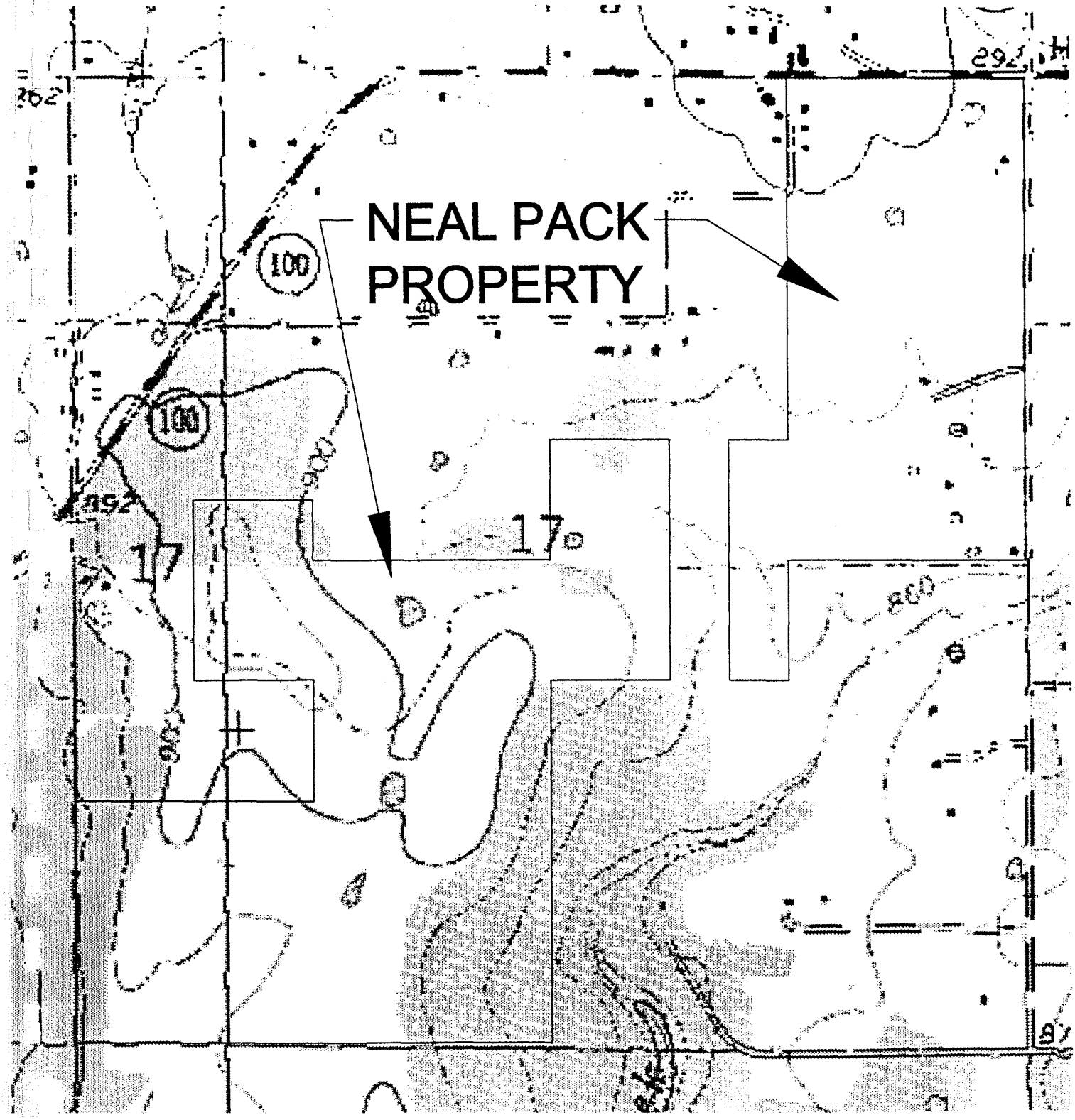
8. Sludge shall not be applied to land within 100 feet from a stream or body of water.
9. Sludge shall not be applied within 250 feet of a private water supply or 600 feet of a public water supply.
10. No off site storage of sludge. No stockpiling of sludge.
11. Sludge should be applied only to soil having a pH of 6.5 or greater. The soil may be treated with lime to raise the pH before sludge application.
12. Each annual application must be followed by a crop.

Landowner's signature Neal A. Pack Date 5-30-01


(Joins Sheet 3)
T. 13 N.
Blackgum
NEAL PACK PROPERTY
17
18
13
Branch
PINE COVE CREEK STATE PARK
ROCK QUARRY
Round Mountain
DAM
Scale 1:20 000
1 Mile
5 000 Feet
½
0
LnC
LnD
PcB
PcC
SrB
HeF
SoA
LoD3


NEAL PACK
PROPERTY
100
100
17
17
800
900
292

ATTACHMENT 5

ALLOWABLE APPLICATION RATES BASED ON NITROGEN FOR VARIOUS CROPS

DETERMINATION OF ANNUAL APPLICATION RATES

1 CROP TO BE PLANTED:	BERMUDA GRASS	NATIVE GRASS	OTHER FORAGES	CORN	RYE	OATS/ BARLEY	SOYBEANS
REQUIRED LBS/A PA-N:	200	75	200	150	75	75	200
2 DETERMINE PA-N VALUE OF SLUDGE:							
TKN, ppm	8.93	8.93	8.93	8.93	8.93	8.93	8.93
MINUS NH3-N, ppm	4.04	4.04	4.04	4.04	4.04	4.04	4.04
MINUS NO3-N, ppm	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ORGANIC N =, ppm	4.89	4.89	4.89	4.89	4.89	4.89	4.89
20% ORGANIC N =, ppm	0.98	0.98	0.98	0.98	0.98	0.98	0.98
ADD NH3-N, ppm	4.04	4.04	4.04	4.04	4.04	4.04	4.04
ADD NO3-N, ppm	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA-N, ppm	5.02	5.02	5.02	5.02	5.02	5.02	5.02
CONVERT PPM TO LBS	85.10	85.10	85.10	85.10	85.10	85.10	85.10
FIND LBS PA-N/DT	0.33	0.33	0.33	0.33	0.33	0.33	0.33
3 DETERMINE DRY TONS PER ACRE OF SLUDGE:							
REQUIRED LBS/A PA-N:	200.00	75.00	200.00	150.00	75.00	75.00	200.00
DIVIDE BY LBS PA-N/DT	0.33	0.33	0.33	0.33	0.33	0.33	0.33
DRY TONS/ACRE	607.30	227.74	607.30	455.48	227.74	227.74	607.30
5 ANNUAL SLUDGE APPLICATION							
RATE WILL NOT EXCEED:, TONS/ACRE	25.00	25.00	25.00	25.00	25.00	25.00	25.00

ATTACHMENT 6

MONTHLY ACTIVITY REPORT

MONTHLY ACTIVITY REPORT

PROJECT:_____ FOR MONTH OF:_____

TOTAL DRY TONS APPLIED:_____

DATE	VOLUME OF SLUDGE APPLIED	% SOLIDS	DRY TONS	APPLICATION SITE

ATTACHMENT 7

SPILL REPORT FORM

SPILL REPORT

Date of Spill:_____ Time of Day:_____

Location:_____

_____

Type of Sludge Spilled:_____

_____

Estimated Volume of Spill:_____

_____

Cause of Spill:_____

_____

Clean up Measures Taken:_____

_____

_____

_____

Personnel Involved (Spill & Clean Up):_____

_____

_____

Officials Contacted (Names & Positions):_____

_____

_____

Other Comments:_____

_____

_____

_____

Person Reporting

_____ _____

Signature Date of Report

IMPORTANT!! The County Health Department must be notified of all spills that occur off the wastewater treatment plant site.

ATTACHMENT 8

DAILY OPERATIONS REPORT FORM

TENKILLER STATE PARK

WASTEWATER LAGOONS

Daily Operations Report

PROJECT: _____ DATE: _____

COMPLETED BY: _____ Driver or Truck No.:_____

Load	Time	Field	Gallons	

ATTACHMENT 9

MONTHLY SLUDGE APPLICATION REPORT FORM

MONTHLY ACTIVITY REPORT

PROJECT:_____ FOR MONTH OF:_____

TOTAL DRY TONS APPLIED:_____

DATE	VOLUME OF SLUDGE APPLIED	% SOLIDS	DRY TONS	APPLICATION SITE

ATTACHMENT 10

DAILY INSPECTION REPORT FORM

TENKILLER STATE PARK

WASTEWATER LAGOONS

Daily Inspection Report

PROJECT: _____ DATE: _____

Field: _____ Contractor: _____ Application Rate:_____

HAUL DATA

Lagoon_____ Gallons to Date_____

Date_____ Lagoon_____ Field_____ Gallons_____
Date_____ Lagoon_____ Field_____ Gallons_____
Date_____ Lagoon_____ Field_____ Gallons_____
Date_____ Lagoon_____ Field_____ Gallons_____
Date_____ Lagoon_____ Field_____ Gallons_____

Weather_____ Temperature_____ T. S._____

Haul Route Checked _____ Sample Check In _____

Remarks:

Signature _____